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OCCURRENCE OF SOME PARASITES AND A COMMENSAL IN THE AMERICAN LOBSTER, *HOMARUS AMERICANUS*, FROM THE MID-ATLANTIC BIGHT¹

Larvae of the nematode *Ascarophis* sp. were reported by Uzmans (1967b) from American lobsters collected from Hudson, Block, Veatch, and Corsair Canyons on the edge of the continental shelf east and south of southern New England (Fig. 1). Following parasitological examinations of over 3,000 coastal and offshore lobsters, Uzmans (1970) reported that the nematode larvae were restricted almost exclusively to offshore lobsters. Adult *Ascarophis* sp. are intestinal parasites of fishes (Uspenskaya 1953).

Although coastal and offshore lobsters occur off

northern and central New Jersey, coastal lobsters are scarce or absent south of Cape May, NJ. There is an active offshore commercial lobster fishery along the edge of the continental shelf south to Norfolk Canyon (Fig. 1).

Materials and Methods

To determine whether offshore lobsters in the Mid-Atlantic Bight have larval *Ascarophis* sp., we examined the guts of 218 American lobsters, *Homarus americanus*, collected from August 1975 through March 1977. Lobsters from this region had not been examined previously for parasites.

One hundred and ninety-seven of the lobsters examined were caught in lobster traps or trawl nets by commercial and research vessels in Norfolk and Washington Canyons and from the shelf and slope between and adjacent to those canyons (areas III-V, Fig. 1) at depths of 73-402 m. The remaining 21 lobsters were caught by trawl nets from research vessels off the coasts of Delaware and New Jersey at depths of 57-95 m (area VIII, Fig. 1).

The intestines and rectum were excised from live lobsters on shipboard (70% of the samples) or in the laboratory at the Virginia Institute of Marine Science, split longitudinally, and fixed in 10% Formalin² or in Davidson's fixative. No free parasites were found in the gut contents. In the laboratory, the gut was transferred to 35% glycerine in 70% ethanol, and part of the ethanol evaporated in a 55°C oven. Pieces of the gut were then laid open, pressed between two 35 × 50 mm slides, and examined for the presence of cysts. This procedure followed the recommendation of J. R. Uzmans³.

Results

Thirty-nine American lobsters were infected with larval *Ascarophis* sp., encapsulated in the anterior wall of the rectum (Table 1). The proportion of infection in 218 lobsters (17.9%) from the Mid-Atlantic Bight was similar to that reported by Uzmans (1967b), when examined in a 2 × 2 contingency table and using Yates' correction for continuity (Elliott 1971). Uzmans (1967b) reported 77 infections in 314 lobsters (24.5%) collected east and south of southern New England. However, Boghen (1978) reported infection in the gills of 82 out of 233 lobsters (35.2%)

²Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

³J. R. Uzmans, Northeast Fisheries Center Woods Hole Laboratory, National Marine Fisheries Service, NOAA, Woods Hole, MA 02543, pers. commun. June 1974.

¹Contribution No. 1277, Virginia Institute of Marine Science, Gloucester Point, VA 23062.

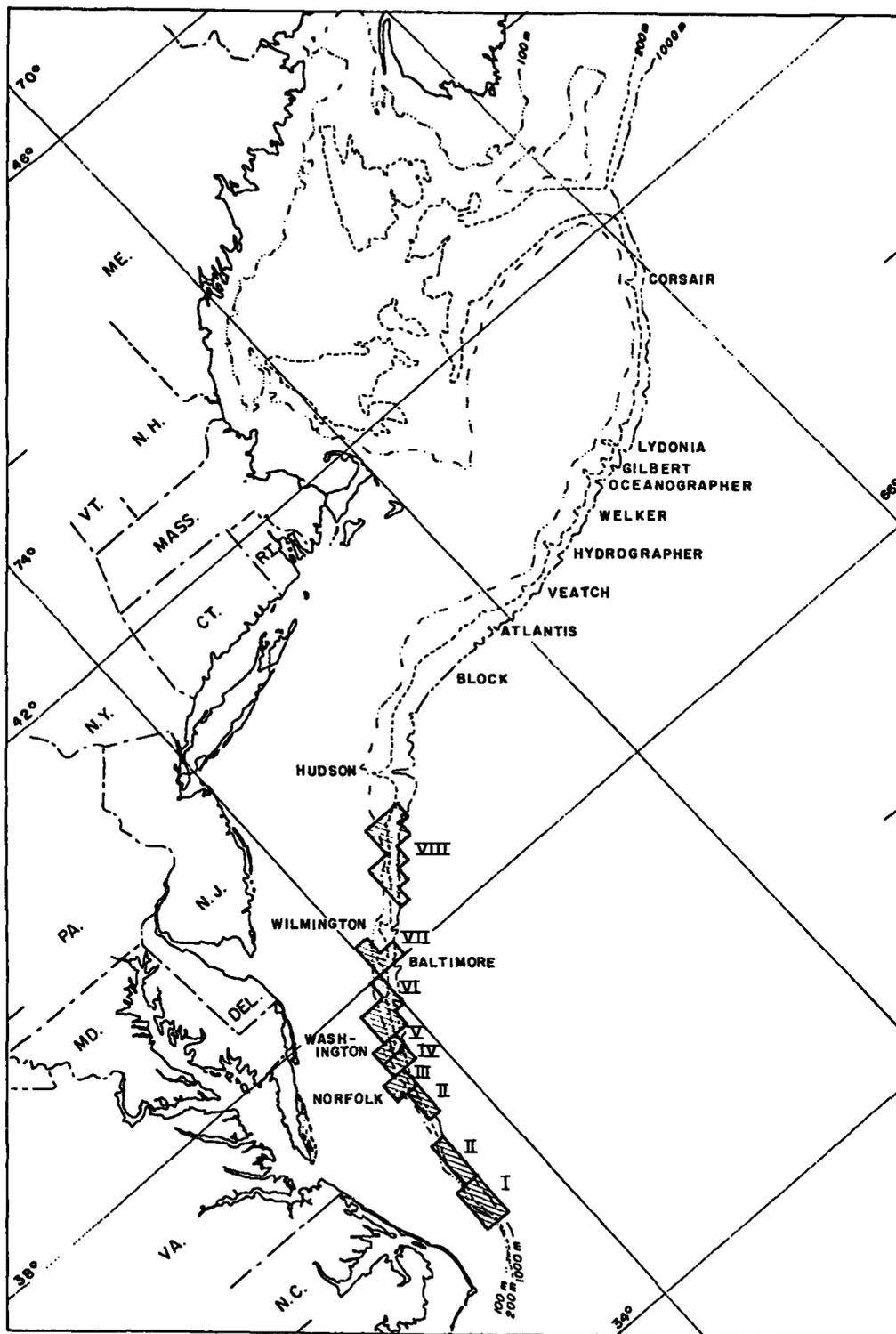


FIGURE 1.—Canyons and lobster sampling sites along the edge of the continental shelf, between Cape Hatteras and the eastern edge of Georges Bank.

TABLE 1.—Prevalence of American lobsters infected with nematodes, *Ascarophis* sp., in the Mid-Atlantic Bight, August 1975–March 1977.

Date	Area ¹	No. lobsters sampled (No. infected)			Prevalence of infection (%)		
		M	F	Sexes combined	M	F	Sexes combined
Aug., Sept. 1975	III	26(1)	236(6)	63(7)	3.8	16.2	11.1
Dec. 1975	III	18(3)	18(2)	36(5)	16.7	11.1	13.9
Jan. 1975	III	3(1)	16(5)	19(6)	33.3	31.3	31.6
Jan. 1976	IV	11(1)	13(1)	24(2)	9.1	7.7	8.3
Apr. 1976	III	6(3)	9(2)	15(5)	50.0	22.2	33.3
Apr. 1976	V	4(2)	16(4)	20(6)	50.0	25.0	30.0
July 1976	V	7(1)	5(2)	12(3)	14.3	40.0	25.0
Oct. 1976	V	3(0)	5(2)	8(2)	0.0	40.0	25.0
Nov. 1976	VIII	11(1)	6(2)	17(3)	9.1	33.3	17.6
Mar. 1977	VIII	2(0)	2(0)	4(0)	0.0	0.0	0.0
Total		91(13)	127(26)	218(39)	14.3	20.5	17.9

¹ III. Norfolk Canyon and adjacent slope

IV. Between Norfolk and Washington Canyons

V. Washington Canyon

VIII. Between Wilmington and Hudson Canyons.

*One 86 mm female contained 33 acanthocephalan cysts, *Corynosoma* sp.

from Northumberland Strait, southern Gulf of St. Lawrence. That higher proportion of infection was highly significantly different from that reported off southern New England and in the Mid-Atlantic Bight.

Mid-Atlantic Bight lobsters examined for parasites ranged from 49 to 179 mm carapace length (CL) (Table 2). Larval *Ascarophis* sp. were found in 13 (14.3%) of 91 male lobsters and in 26 (20.5%) of 127 female lobsters. No significant difference in prevalence of infection between males and females, when size was ignored, could be demonstrated with a 2 × 2 contingency table analysis. This agrees with the absence of sex specificity in the canyon lobsters

TABLE 2.—Numbers of American lobsters examined and prevalence of infection by the larvae of the nematode *Ascarophis* sp. in the Mid-Atlantic Bight.

Size range, CL mm	No. examined			No. infected			Percent of group infected	Percent of total infected	No. larvae, range
	M	F	Sum	M	F	Sum			
40-49	0	2	2	0	2	2	100.0	0.9	1-12
50-59	5	7	12	2	1	3	25.0	1.4	1-9
60-69	9	21	30	1	8	9	30.0	4.1	1-13
70-79	27	29	56	4	7	11	19.6	5.0	1-4
80-89	20	37	57	2	4	6	10.5	2.8	1-5
90-99	16	19	35	3	3	6	17.1	2.8	1-8
100-109	7	8	15	1	1	2	13.3	0.9	2-3
110-119	2	2	4	0	0	0			
120-129	2	1	3	0	0	0			
130-139	0	0	0	0	0	0			
140-149	1	1	2	0	0	0			
150-159	0	0	0	0	0	0			
160-169	1	0	1	0	0	0			
170-179	1	0	1	0	0	0			
Total	91	127	218	13	26	39		17.9	
110-149	5	4	9	0	0	0			
150-179	2	0	2	0	0	0			

reported by Uzmann (1967b) and also reported from Northumberland Strait by Boghen (1978).

Almost one-half (46.3%) of all infections occurred in the 60-79 mm size classes; intensity of infection ranged from 1 to 13 (mean 3.0) (Table 2). None of the 11 lobsters >110 mm CL contained parasites. Boghen (1978) reported 51.3% infection in the 60-69.9 mm range. When the occurrences of parasites in males and females are arranged in three size groups, 40-59, 60-79 and 80-109 mm, and statistically examined with a 2 × 3 contingency table, no departure from the expected 1:1 ratio was observed.

A single specimen of the commensal polychaete, *Histriobdella homari*, was obtained from the gills of a female lobster, 82 mm CL, caught in Norfolk Canyon in June 1974. Gills of four other lobsters were excised, placed in dilute seawater in specimen bowls, and refrigerated overnight. The polychaete was found in the sediment collected from one gill. Because of the small number of lobster gills examined, an estimate of prevalence is inappropriate. Previously, *Histriobdella* was reported by Uzmann (1967a) in the gills and by Simon (1968) in the gills and bodies of New England lobsters, and by Boghen (1978) in the branchial chamber and gills of lobsters from Northumberland Straits.

One female lobster, 86 mm CL, caught in Norfolk Canyon in August 1975, was infected with cysts of an acanthocephalan, *Corynosoma* sp. Thirty-three cysts were found in the intestinal wall and in the mesenteries along the outside of the intestine. Adult *Corynosoma* sp. are parasites of mammals and aquatic birds; crustaceans are first intermediate hosts and fishes are second intermediate hosts (Yamaguti 1963).

According to Uzmann (1970), *Corynosoma* sp. is a discriminator of coastal lobster stocks. Therefore its presence in a lobster taken in Norfolk Canyon indicates that migration from inshore to offshore waters occurs. Montreuil (1954) reported that the acanthocephalan infections in lobsters from the Magdalen Islands, Gulf of St. Lawrence, varied with the sex of the lobster and by season: 20% of females and 20% of males had cysts seemingly acquired towards the end of summer and early fall. Boghen (1978) attributed the absence of cysts in his Northumberland Strait samples to the fact that the lobsters were collected before the end of summer.

Discussion

The variety of animal parasites and their intensity of infection are small in the Mid-Atlantic Bight lobsters. Differences in the occurrence and rates of

infection of *Ascarophis* and *Corynosoma* and of the commensal *Histriobdella* reported from American lobsters of the Mid-Atlantic Bight, southern New England waters, and the Gulf of St. Lawrence, are not large and could be attributed to differences in sample sizes or season of sampling. Peculiarly, cysts of the sporozoan *Porospora* sp. were not seen in Mid-Atlantic Bight lobsters, but occurred in most lobsters in the Gulf of St. Lawrence (Montreuil 1954; Boghen 1978) and were reported by Uzmann (1970) from southern New England waters. Cysts of the trematode *Stichocotyle* sp. were reported by Nickerson (1895) from Penobscot Bay, ME, and from lobster dealers in Boston, MA; by Linton (1940) from an un-stated region, probably Woods Hole, MA; by Uzmann (1970) from southern New England waters; and by Montreuil (1954) from southern Nova Scotia or southeastern New Brunswick. Nickerson (1895) found the cysts only in the intestinal tract at the union of the intestine and rectum.

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RESILIENCE OF THE FISH ASSEMBLAGE IN NEW ENGLAND TIDEPOOLS¹

Factors regulating density and species composition of tidepool fishes have been little studied, particularly in comparison to other elements of the intertidal community (Gibson 1982). Twenty-two collections of fishes were made in two tidepools at the Marine Science and Maritime Studies Center of Northeastern University at Nahant, MA, during summers from 1967 to 1985. Initially, the purpose was simply to demonstrate to my summer class in ichthyology the technique of collecting fishes with rotenone. After several years, it became apparent that there would be interest in examining long-term effects of repeated poisoning of the same pools. The purpose of this paper is to report the data from this series of samples and to compare the resilience of this New England tidepool fish fauna with studies done in the Gulf of California (Thomson and Lehner 1976), the central California coast (Grossman 1982), and South Africa (Beckley 1985). Unfortunately, there are no other similar tidepools in the area, so it was not possible to make control collections from unsampled pools.

Methods

The same two tidepools were sampled each summer from 1967 to 1985. The tidepools are located on the ocean side of East Point, in Broad Sound. The higher pool is at about 2 m elevation and is about 1 m deep at high tide; the lower pool is slightly below 1 m elevation, contains extensive red and brown algal growth, and is shallower. Average tidal amplitude is slightly over 3 m. One collection was made each year except for 1969, 1982, and 1983 when two collections were made, spaced about 2 wk apart. Collections

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